

Specification of Robert Milburn and Thomas Browning : drying and treating sewage deposit, &c.;

Contributors

Milburn, Robert.
Browning, Thomas.

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A.D. 1871, 11th OCTOBER. N° 2696.

S P E C I F I C A T I O N

OF

ROBERT MILBURN
AND
THOMAS BROWNING.

DRYING AND TREATING SEWAGE
DEPOSIT, &c.

LONDON:

PRINTED BY GEORGE E. EYRE AND WILLIAM SPOTTISWOODE,

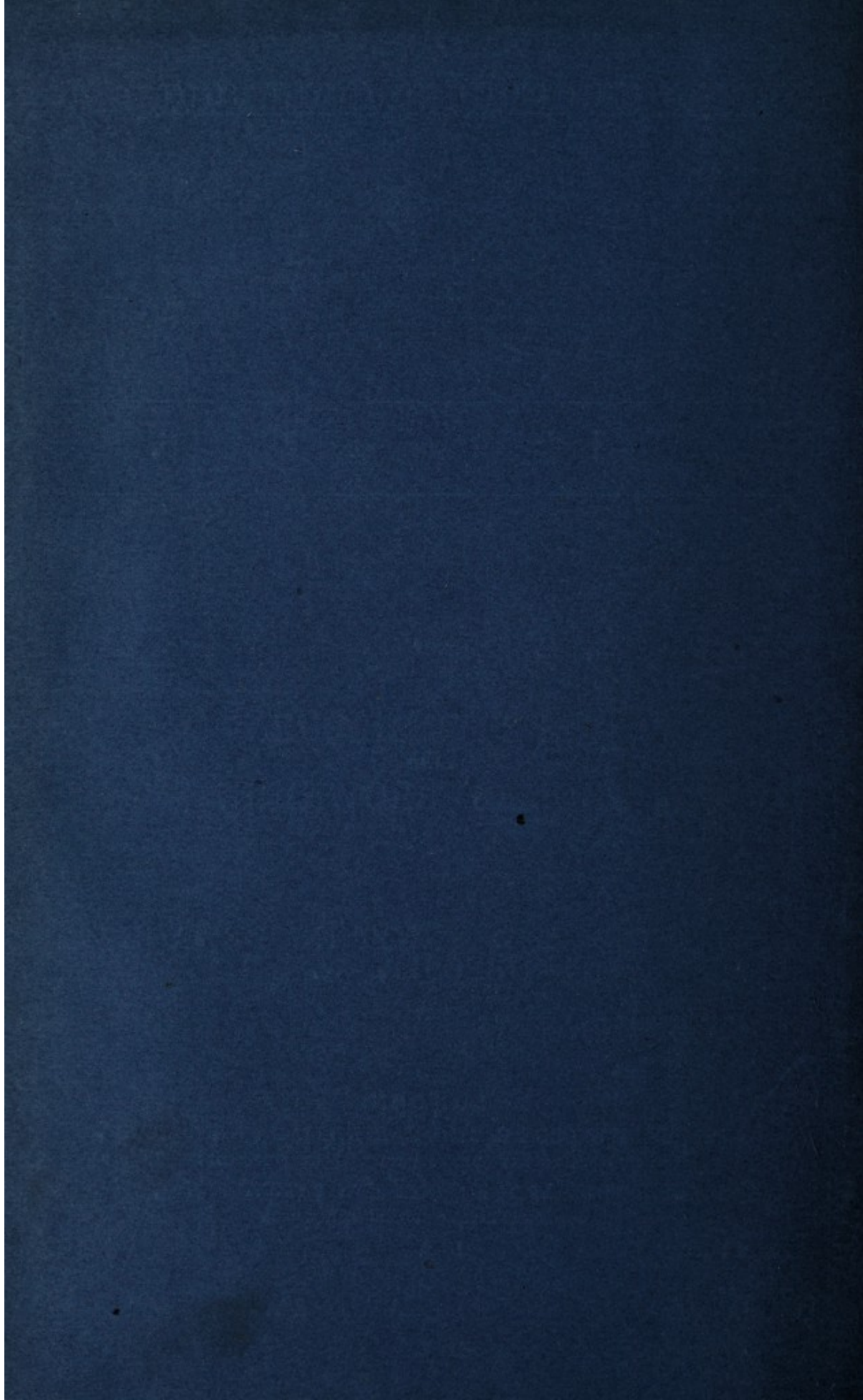
PRINTERS TO THE QUEEN'S MOST EXCELLENT MAJESTY:

PUBLISHED AT THE GREAT SEAL PATENT OFFICE,

25, SOUTHAMPTON BUILDINGS, HOLBORN.

Price 10s.

1872.





A.D. 1871, 11th OCTOBER. N° 2696.

Drying and Treating Sewage Deposit, &c.

LETTERS PATENT to Robert Milburn and Thomas Browning, both of Number 76, Church Lane, Whitechapel, London, in the County of Middlesex, for the Invention of "IMPROVEMENTS IN APPARATUS FOR DRYING AND TREATING SEWAGE DEPOSIT AND SOME OTHER MATTERS."

Sealed the 26th January 1872, and dated the 11th October 1871.

PROVISIONAL SPECIFICATION left by the said Robert Milburn and Thomas Browning at the Office of the Commissioners of Patents, with their Petition, on the 11th October 1871.

We, **ROBERT MILBURN** and **THOMAS BROWNING**, both of Number 76, 5 Church Lane, Whitechapel, London, in the County of Middlesex, do hereby declare the nature of the said Invention for "IMPROVEMENTS IN APPARATUS FOR DRYING AND TREATING SEWAGE DEPOSIT AND SOME OTHER MATTERS," to be as follows:—

Our Invention has for its object more particularly to recover fertilizing salts and other matters from sewage deposit or from excreta, and to

Milburn & Browning's Impts. in Drying & Treating Sewage Deposit, &c.

obtain the same in a dry or partially dry state, and our Invention is also applicable to be employed in drying some other matters, as for example chemicals, dye stuffs, cement, or yeast.

To effect this object we introduce the said sewage deposit or other matter into a cylinder or retort, by preference made of fire-clay and 5 mounted and enclosed in a chamber or oven and exposed therein to the heat of a furnace. The ends of the said retort or cylinder by preference project through the walls of the said chamber or oven. One end of the said retort may be closed or partially closed, and the other end be provided with a door or opening for delivery of the dried sewage or 10 other matter, and a hopper or feed pipe leading into the interior of the said retort may be fitted or fixed at the closed or partially closed end of the said retort. Revolving lifters or scrapers are employed to stir or keep in motion the contents of the said retort during the operation, and the said lifters or scrapers may be constructed so as if required to 15 pulverize or partially pulverize the dried sewage or other matter previous to delivery thereof from the said retort.

The process by preference is made continuous, that is to say, the material to be treated is gradually fed in at one end of the said retort and delivered from the other end thereof at a proportionate speed. The 20 vapours, gases, and noxious fumes disengaged from the matters within the said retort pass through an aperture or through apertures formed in the upper part of the retort, and entering the chamber or oven mingle with the products of combustion from the furnace; this especially in the treatment of sewage being an important feature of our Invention. 25

Scrapers actuated by hand or power may be employed to remove any accumulation of soot which may form on the outer surface of the said retort. Two or more of such retorts may be enclosed or mounted in one chamber or oven, and be heated by one or more furnaces according to the length and number of the said retorts in the oven, or the waste heat 30 from steam boilers or other furnaces may be employed for the heating medium.

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SPECIFICATION in pursuance of the conditions of the Letters Patent, filed by the said Robert Milburn and Thomas Browning in the Great Seal Patent Office on the 10th April 1872.

TO ALL TO WHOM THESE PRESENTS SHALL COME, we, **ROBERT**
5 **MILBURN** and **THOMAS BROWNING**, both of Number 76, Church Lane, Whitechapel, London, in the County of Middlesex, send greeting.

WHEREAS Her most Excellent Majesty Queen Victoria, by Her Letters Patent, bearing date the Eleventh day of October, in the year of our Lord One thousand eight hundred and seventy-one, in the
10 thirty-fifth year of Her reign, did, for Herself, Her heirs and successors, give and grant unto us, the said Robert Milburn and Thomas Browning, Her special license that we, the said Robert Milburn and Thomas Browning, our executors, administrators, and assigns, or such others
15 administrators, and assigns, should at any time agree with, and no others, from time to time and at all times thereafter during the term therein expressed, should and lawfully might make, use, exercise, and vend, within the United Kingdom of Great Britain and Ireland, the Channel Islands, and Isle of Man, an Invention for "**IMPROVEMENTS IN**
20 **APPARATUS FOR DRYING AND TREATING SEWAGE DEPOSIT AND SOME OTHER MATTERS,**" upon the condition, amongst others, that we, the said Robert Milburn and Thomas Browning, our executors, administrators, and assigns, by an instrument in writing under my, or their, or one
25 of their hands and seals, should particularly describe and ascertain the nature of the said Invention, and in what manner the same was to be performed, and cause the same to be filed in the Great Seal Patent Office within six calendar months next and immediately after the date of the said Letters Patent.

NOW KNOW YE, that we, the said Robert Milburn and Thomas
30 Browning, do hereby declare the nature of the said Invention, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement and accompanying Drawings, that is to say:—

Our Invention has for its object more particularly to recover fertilising
35 salts and other matters from sewage deposit or from excreta, and to

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obtain the same in a dry or partially dry state, and our Invention is also applicable to be employed in drying some other matters, as for example chemicals, dye stuffs, cement, or yeast.

To effect this object we introduce the said sewage deposit or other matter into a cylinder or retort which is mounted and enclosed in a chamber or oven, and exposed therein to the heat of a furnace. The ends of the said retort or cylinder by preference project through the end walls of the said chamber or oven. One end of the said retort may be closed or partially closed and the other end be provided with a door or opening for delivery of the dried sewage or other matter. A hopper or feed pipe leading into the interior of the said retort may be fitted or fixed at the closed or partially closed end of the said retort. Revolving lifters or scrapers are employed to stir or keep in motion the contents of the said retort during the operation, and the said lifters or scrapers may be constructed so as if required to pulverise or partially pulverise the dried sewage or other matter previous to delivery thereof from the said retort.

The process by preference is made continuous, that is to say, the material to be treated is gradually fed in at one end of the said retort and delivered from the other end thereof at a proportionate speed. The vapours, gases, and noxious fumes disengaged from the matters within the said retort pass through an aperture or through apertures formed in the upper part of the retort, and mingle with the products of combustion from the furnace; this especially in the treatment of sewage being an important feature of our Invention.

Scrapers actuated by hand or power may be employed to remove any accumulation of soot which may form on the outer surface of the said retort. Two or more of such retorts may be enclosed or mounted in one chamber or oven, and be heated by one or more furnaces according to the length and number of the said retorts in the oven, or the waste heat from steam boilers or other furnaces may be employed for the heating medium.

And in order that our Invention may be more thoroughly understood, we have attached hereunto a Sheet of Drawings made to a scale of about one-half inch to the foot and marked with letters of reference, to which Drawings we will now refer.

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Fig. 1 represents a vertical longitudinal section; Fig. 2 a vertical cross section on the line A, B; and Fig. 3 a front end elevation of an oven fitted with one drying retort. The retort D is made of a cylindrical form, and is supported on the side walls T, T, which extend from one
5 end of the oven nearly to the other end thereof.

In our Provisional Specification we mentioned that we should prefer to form the said retort of fire-clay, but since the filing of the said Specification we have found cast or wrought iron to be more suitable than the said fire-clay; but any material may be used as preferred or
10 found to be most suitable. We may state that the said retort may be conveniently made of cast iron in sections formed with flanches, by means of which the said sections may be bolted together to form a retort of any desired length. The retort is covered or enclosed by an arched
15 wall U, the space between the said wall and the upper part of the retort forming the hopper or return flue P. Apertures R, R, communicating with the said return flue are formed in the upper part of the retort, the vapours, gases, and noxious fumes from the retort flowing through the said apertures into the said return flue. A furnace
20 N is constructed under the front end of the retort, and the heated gases from the said furnace flow through the lower flue O to the back end of the retort, and passing through side flues rise into the return flue U, through which they flow to the front end of the oven and pass through the flue S to the chimney. A shaft F is mounted within the retort and on the said shaft are fixed arms which carry the lifters, agitators, or
25 pulverisers E, E. A driving pulley H which is fixed on the shaft K gives motion to the shaft F through the bevil pinion L, which gears with the bevil wheel M, which is fixed on the shaft F. As the said shaft is thus caused to revolve, the agitators E, E, maintain the matters within the retort in constant motion and prevent them from agglom-
30 merating. The said matters are introduced into the retort through the hopper C, and are discharged from the other end G of the retort.

Fig. 4 represents a modified arrangement more particularly suitable for sewage or matters not liable to be injured by direct contact with smoke. In this example the lower part of the retort or oven consists of a semi-
35 cylindrical metal trough V, and the upper part of an arched or semi-cylindrical wall U, the space X between the said trough and the said wall forming a return flue for the heated gases which flow through the flue Y to the chimney.

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Having now fully described the nature of our said Invention, and methods for carrying the same into practical effect, we would have it to be understood that we claim, the employment of retorts or ovens constructed, fitted, and arranged substantially as and for the purposes herein-before described and set forth, and as illustrated by the 5 accompanying Drawings.

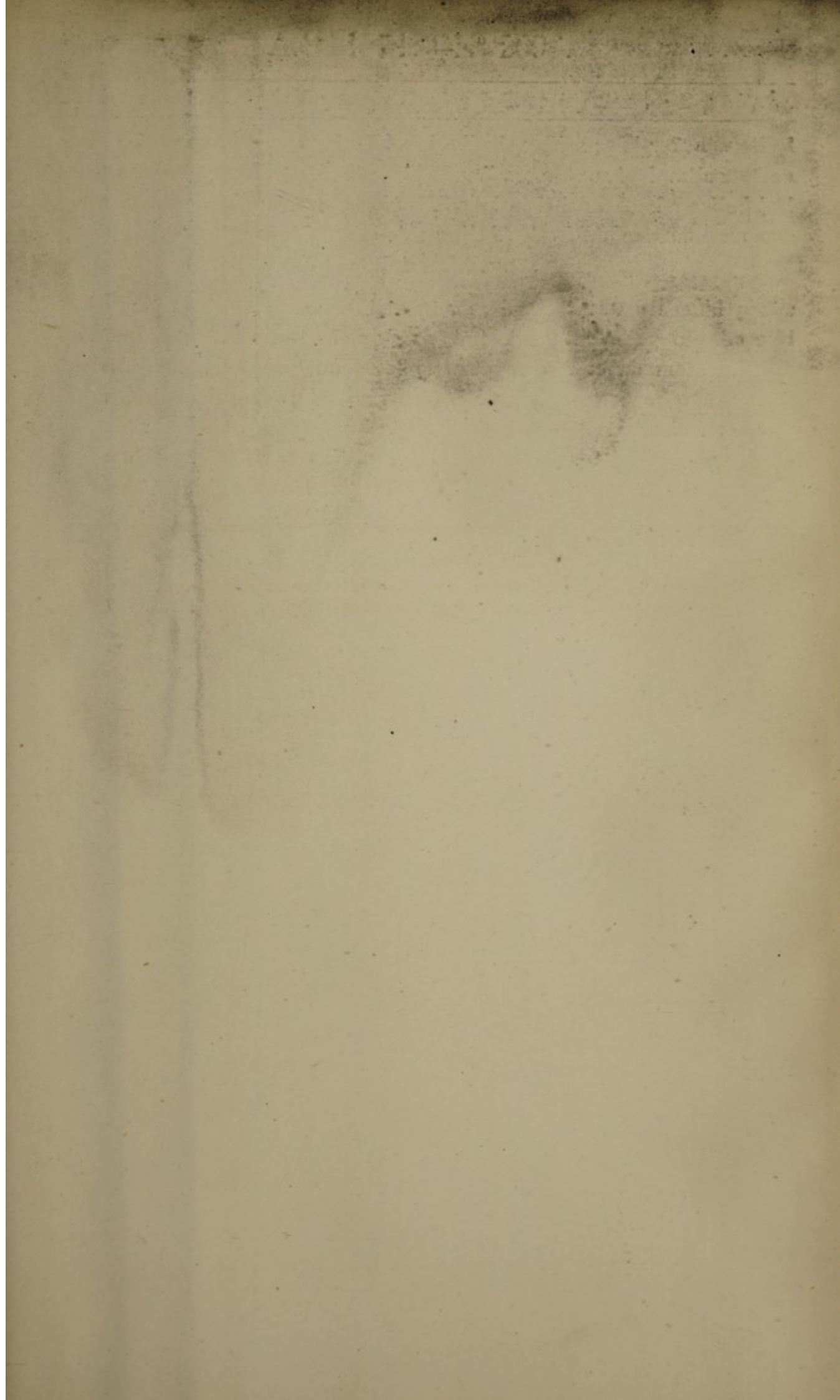
In witness whereof, we, the said Robert Milburn and Thomas Browning, have hereunto set our hands and seals, this Fourth day of April, in the year of our Lord One thousand eight hundred and seventy-two. 10

ROBT MILBURN. (L.S.)

THO^s BROWNING. (L.S.)

LONDON:

Printed by GEORGE EDWARD EYRE and WILLIAM SPOTTISWOODE,
Printers to the Queen's most Excellent Majesty. 1872.



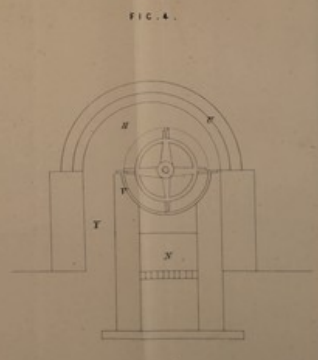
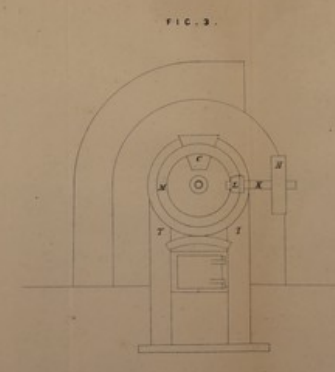
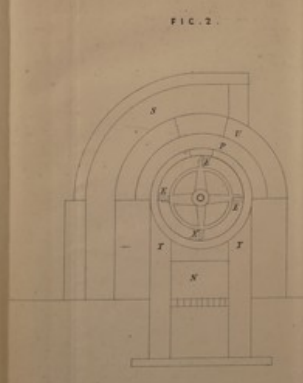
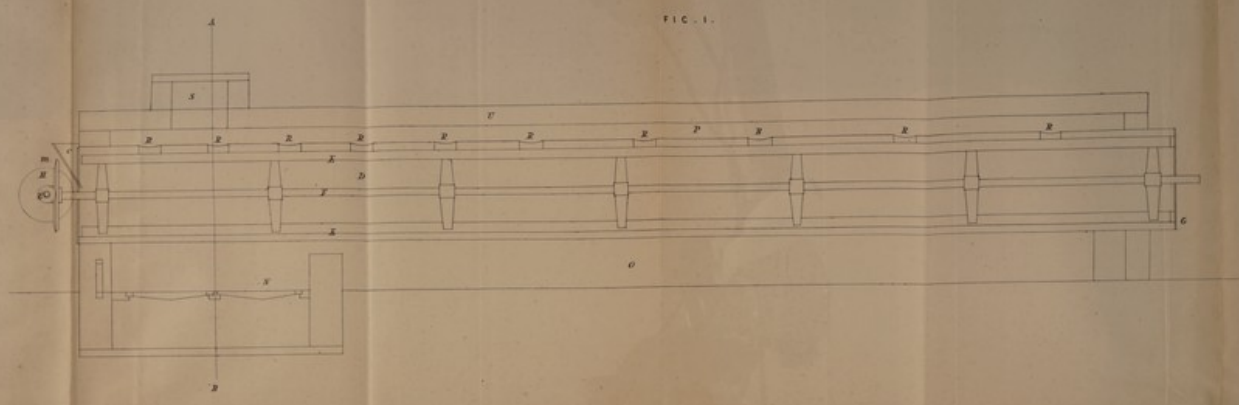
THE UNIVERSITY OF CHICAGO

PHYSICS DEPARTMENT

PHYSICS 311

PROBLEM SET 1

Assigned by Professor Howard Georgi and William Kinoshita
Distributed in the Department of Physics, Chicago



The steel drawing is partly colored.

